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Apparent Mean Annual Variations.

Years.	Ann. Var. in R.A.	Ann. Var. in N.P.D.
	s	
1864–1872	+3·024	+18''·08
1872–1880	+2·975	+18·48

Now, as the annual precession is, for the mean epoch, $+3^{\mathrm{s}}\cdot413$ in R.A. and $+19''\cdot35$ in N.P.D., we have, for the mean proper motions from the two comparisons, $-0^{\mathrm{s}}\cdot413$ in R.A. and $-1''\cdot07$ in N.P.D.

3. The third and last of these stars is Oeltzen's Argelander 17415–6, of which I gave a provisional determination of the proper motion in the *Monthly Notices* for December 1870 (vol. xxxi. p. 42). It was not, as it happened, included in any great Greenwich catalogue until the 9-year; I can therefore now only compute its proper motion from Greenwich observations by comparing the places in that catalogue and in the recent 10-year. The former (where it is No. 1619) is R.A. $17^{\mathrm{h}}\ 37^{\mathrm{m}}\ 10^{\mathrm{s}}\cdot302$, N.P.D. 21° 32′ 38″·94; number of observations, four in each element; epoch 1872. The latter (where it is No. 2786) is R.A. $17^{\mathrm{h}}\ 37^{\mathrm{m}}\ 7^{\mathrm{s}}\cdot400$, N.P.D. 21° 33′ 4″·15; number of observations, four in each element; epoch 1880. This gives apparent annual variation $-0^{\mathrm{s}}\cdot363$ in R.A. and $+3''\cdot15$ in N.P.D.; and as the precession for the mean epoch is $-0^{\mathrm{s}}\cdot297$ in R.A. and $+2''\cdot00$ in N.P.D., we have, finally, for the deduced values of the proper motion in R.A. and N.P.D. respectively, $-0^{\mathrm{s}}\cdot066$ and $+1''\cdot15$.

Blackheath:
1890 *April* 23.

On a coming Conjunction of a Remarkable Dark Spot on Jupiter with the Red Spot, and the relative Altitudes of these Objects.

By A. Stanley Williams.

It is now twelve years since the great Red Spot made its appearance upon *Jupiter*, or at least since it first attracted general attention, and notwithstanding all the consideration that has been bestowed upon it during these twelve years, it still remains almost as much of an enigma as at its first appearance. Especially nothing is yet known for certain with regard to the altitude of the spot in the atmosphere of the planet, or with reference to neighbouring markings. A number of observations, it is true, have been made bearing upon this subject, but they are none of them decisive. Indeed, they differ curiously from each other. The object of this note is to call attention to an *unrivalled and unique opportunity* of obtaining conclusive evidence upon this important question, which is now on the point of occurring.

It is well known that most of the spots and markings of *Jupiter* situated to the south of the great equatorial system of

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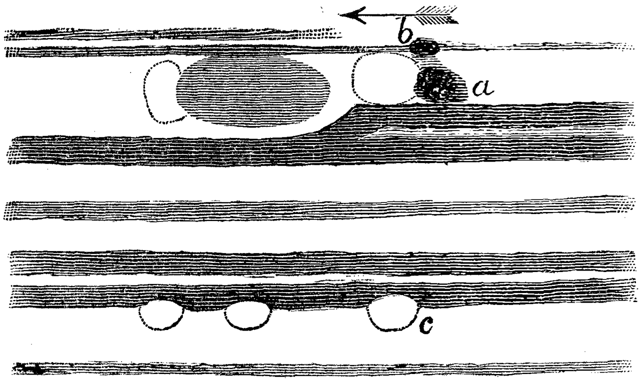
belts have a slow motion from east to west relative to the Red Spot. A remarkable dark spot is now visible on the south side of the South Equatorial Belt, which by virtue of this westerly motion or drift must in a short time overtake that marking, provided, of course, that the conditions continue to remain unchanged. The spot in question is a large, dark, very prominent and very striking feature, and is marked *a* in the accompanying figure, which represents the equatorial region of *Jupiter* as it appeared about the end of May. It is evident that, if the spot continues to sweep onwards from east to west, in the direction of the arrow, it must eventually overtake and pass the Red Spot. In that case it must, if situate at a higher level, cover about half the breadth of the latter marking. If, on the other hand, it should lie at a lower level in the atmosphere of the planet, then the spot should disappear altogether from view. If at about the same level it would probably be diverted.



Since the year 1879 I have observed *Jupiter* and the Red Spot more or less continuously, and in all that time have seen no other spot of such a striking and conspicuous character and so magnificently suited to solve the vexed question of the altitude of the latter marking compared with neighbouring objects. I therefore venture to call the attention of observers to the importance of taking advantage of this *unrivalled opportunity*, which may never occur again. It should be mentioned that the dark spot *a* was first observed as long ago as the commencement of June in last year, and has consequently already been visible for more than twelve months. It still retains almost the same appearance which it possessed when first seen, and there is therefore every prospect of its continuing visible as a prominent object for a considerable time longer. The following are the approximate dates on which the dark spot *a* should be in conjunction with different parts of the Red Spot:—

With the following end	29 July 1890
With the centre	28 Aug. 1890
With the preceding end	27 Sept. 1890

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From this it will be seen that the dark spot will take about two months to traverse the length of the Red Spot. It should be closely watched during all this time, but the chief interest obviously attaches to its first encounter with the following end of the latter. This will occur about the date of opposition, when *Jupiter* will be fairly well placed for observation, though his great south declination renders it very desirable that observations should be secured in more southern latitudes. The following are the observed times of transit of the dark spot over the central meridian of the planet's disc which have been obtained in the present year, with the intervals by which it followed Mr. Marth's zero meridian. They show clearly the westerly drift of the spot:—*

Date.	G.M.T. of Transit.	Following zero Meridian by.
	h m	h m
1890 Mar. 28	17 20	1 56·6
May 1	15 5·2	1 33·6
20	15 31·6	1 19·3
30	13 32	1 4·3

Besides the above-mentioned dark spot *a*, there is a little dark spot above it marked *b*. This is also worthy of notice, since in its passage westward it will just skirt the southern edge of the Red Spot, and may perhaps overlap it. Another noteworthy object is the white spot marked *c* in the figure, on the north edge of the North Equatorial Belt. This is remarkable chiefly for its long-continued visibility, since it was first seen as long ago as January 27, 1885, by Mr. Denning at Bristol,† and March 19, 1885, by Dr. Terby at Louvain.‡ It has been observed at every opposition since.

Percy Lodge, Burgess Hill:
1890 *June* 4.

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* The centre of the red spot precedes this zero meridian at the present time by about 14 minutes.

† *Observatory*, 1885, p. 304.

‡ *Études sur l'aspect physique de la Planète Jupiter.* Deuxième Partie: pp. 35–37. The spot is designated Σ by Dr. Terby.

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Observations of Comet a 1890 (Brooks) made at the Royal Observatory, Greenwich.

(*Communicated by the Astronomer Royal.*)

The observations were made with the East or Sheepshanks Equatorial, aperture 6·7 inches, by taking transits over two cross-wires at right angles to each other, and each inclined 45° to the parallel of declination.

Comet a 1890 (*Brooks*).

Greenwich Mean Solar Time.	Observer.	☄−✱ R.A.	Corr. for Refraction.	☄−✱ N.P.D.	Corr. for Refraction.	No. of Comp.	Apparent R.A.	Log. factor of Parallax.	Apparent N.P.D.	Log. factor of Parallax.	Comp. Star.
d h m s		m s	s	′ ″	″		h m s		° ′ ″		
May 15 9 48 5	L.	−0 39·0	0·0	−10 57·3	−0·9	4	...	9·6751	...	0·7964	*a*
10 0 47	„	−0 42·1	0·0	−1 3·7	−0·1	8	...	9·6814	...	0·7823	*b*
10 11 50	„	+1 37·0	0·0	+1 38·5	+0·1	3	20 35 42·0	9·6870	47 34 49·4	0·7700	*c*
10 21 58	„	−0 11·0	0·0	−7 2·2	−0·6	2	...	9·6911	...	0·7581	*d*
17 9 36 40	A. D.	+0 10·3	0·0	+6 18·7	+0·4	3	...	9·6901	...	0·7860	*e*
9 46 14	„	−0 36·0	0·0	+6 27·6	+0·4	3	...	9·6956	...	0·7748	*f*
9 53 21	„	−0 13·0	0·0	−6 42·6	−0·4	2	...	9·6992	...	0·7663	*g*
18 12 47 56	T.	+1 41·9	0·0	−6 20·3	−0·1	6	20 26 53·1	9·6475	44 32 45·6	0·4415	*h*
12 50 58	„	+1 23·2	0·0	−5 19·3	−0·1	5	20 26 54·2	9·6440	44 32 52·5	0·4345	*i*
20 9 44 17	L.	+1 12·3	0·0	−5 18·4	−0·2	2	20 20 44·4	9·7272	42 42 37·4	0·7330	*j*
9 44 17	„	+0 4·3	0·0	+0 7·1	0·0	2	...	9·7272	...	0·7330	*k*
21 9 35 59	H.	−1 10·7	0·0	+0 51·0	0·0	3	20 17 11·5	9·7355	41 44 9·1	0·7276	*l*
9 46 8	„	+0 25·2	0·0	−0 3·4	0·0	4	20 17 10·0	9·7374	41 43 42·5	0·7119	*m*